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Unit 9 - Week 8: Spray theory

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Course outline

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Week 2: Drop size and velocity distributions

Week 3: Atomizers and their designs

Week 4: Atomizers and their designs

Week 5: Atomization theory

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Secondary atomization-

Assignment 8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-03-27, 23:59 IST.**

1) A droplet of diameter 1 mm is moving with the velocity 1m/s surrounded by a flow of air at 25m/s. The density of water is 1000 kg/m^3 and the density of air is 1.225 kg/m^3. What is the drag foce acting on the drop? (Given that the coefficient of drag is 0.5) ***1 point***

- 146 μN
- 554 μN
- 360 μN
- 624 μN

No, the answer is incorrect.
Score: 0

Accepted Answers:
554 μN

2) What is the Weber number and Ohnesorge number for the above flow condition ***1 point***

- 10 and 0.004
- 10 and 0.04
- 1 and 0.04
- 1 and 0.004

No, the answer is incorrect.
Score: 0

Accepted Answers:
10 and 0.004

3) Which mode of drop breakup have uni-model drop size distribution ***1 point***

No, the answer is incorrect.
Score: 0

Accepted Answers:
Vibrational mode

4) The instability in the column of liquid jet is a cause of **1 point**

- Velocity difference
- Density difference
- Surface tension difference
- All the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Surface tension difference

5) Imagine a water droplet of radius 100μm which is being suddenly encountered with a cross flow of wind at a of velocity 10m/s. What is the approximate time required for the momentum imparted to the free surface of the drop to reach its center, T_ν=_____(in seconds)

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.01

1 point

6) For the above flow condition calculate the oscillation time scale, T_o=_____(in seconds)

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.0001

1 point

7) For the above flow condition calculate the drag time scale ,T_d =_____(in seconds)

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.00001

1 point

8) A stationary water drop of diameter 2mm is subjected to a cross flow of air flowing at a velocity of 2m/s. Based on the regime chart developed by Faeth and coworkers (as discussed in the **1 point**

lectures, Faeth et al 1995), the drop is expected to encounter which mode of breakup. (Given, Dynamic viscosity of water =10^{-3} Ns/m^2, surface of water-air interface =72mN/m)

- Shear breakup
- Deformation less than 5 %
- Bag breakup
- Multimode breakup

No, the answer is incorrect.
Score: 0

Accepted Answers:
Deformation less than 5 %

9) For the above problem, the droplet will encounter which mode of breakup if the cross flow air velocity is 100m/s. ***1 point***

- Shear breakup
- Multimode breakup
- Oscillatory deformation
- Deformation greater than 20%

No, the answer is incorrect.
Score: 0

Accepted Answers:
Shear breakup

10) For the same problem, the droplet will encounter which mode of breakup if the droplet is of glycerol and the cross flow air velocity is 100m/s. (Given, Dynamic viscosity of glycerin =0.95Ns/m^2, surface tension of glycerin-air interface =76mN/m) ***1 point***

- Shear breakup
- Deformation less than 5 %
- Deformation greater than 20%
- Oscillatory deformation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Deformation greater than 20%

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